

THE CLAIMS

What is claimed is:

1. A method of detaching a layer from a wafer, which comprises:
creating an weakened zone in a wafer to define the layer to be detached and a
remainder portion of the wafer, such that the weakened zone includes a main region and a
localized super-weakened region that is more weakened than the main region; and

5 initiating detachment of the layer from the remainder portion at the super-
weakened region such that the detachment propagates from the super-weakened region
through the main region to detach the layer from the remainder portion.

2. The method of claim 1, wherein the detachment is initiated by applying
10 a detachment force to the weakened zone that is sufficient to initiate detachment at the super-
weakened region but not at the main region.

3. The method of claim 2, wherein the detachment force is applied to both
the super-weakened region and the main region.

15 4. The method of claim 2, wherein the detachment force is obtained by
applying energy to weakened zone that is sufficient to initiate detachment at the super-
weakened region but not at the main region.

20 5. The method of claim 4, wherein the energy is applied by heating at
least the weakened zone of the wafer.

6. The method of claim 5, wherein the heating is controlled for evening
the heating applied to weakened zone.

25 7. The method of claim 6, wherein the heat is applied substantially evenly
over substantially the entire weakened zone.

8. The method of claim 7, wherein the heating of the weakened zone
30 comprises thermally annealing the wafer.

9. The method of claim 7, wherein the heat is applied by heating elements that are independently controlled for evening the application of heat to the weakened zone.

5 10. The method of claim 9, which further comprises flowing a heat conducting gas over the wafer during thermal annealing.

11. The method of claim 1, wherein the weakened zone is created by implanting a dose of atomic species in the wafer.

10 12. The method of claim 11, wherein the super-weakened region is created by implanting an overdose of the atomic species compared to the dose of atomic species implanted in the main region.

15 13. The method of claim 12, wherein the atomic species is applied in substantially a single operation to both the super-weakened and main regions.

14. The method of claim 12, wherein an initial dose of atomic species is applied to the weakened zone, and the overdose is applied to the super-weakened region
20 before or after the application of the initial dose.

15. The method of claim 1, wherein the weakened zone is created by producing a porous layer in the wafer.

25 16. The method of claim 1, wherein the weakened zone extends through a crystalline layer of the wafer.

17. The method of claim 1, wherein the wafer comprises a semiconductor material.